

Notice of Allowability

Application No.

10/775,146

Examiner

Jennifer M. Dolan

Applicant(s)

TAKIZAWA, TERUO

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amdt of 3/9/06.
2. ☒ The allowed claim(s) is/are 1,3-7 and 10.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 3/9/06
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 5/25/06
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

DETAILED ACTION

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Steven Allis on 25 May 2006.

The application has been amended as follows:

Claims 8 and 9 have been canceled.

Allowable Subject Matter

2. Claims 1, 3-7 and 10 are allowed.
3. The following is an examiner's statement of reasons for allowance:

The primary reason for allowance is the specific combination of forming a single crystal silicon layer on an insulating layer, forming a strain inducing layer on the single crystal layer, and then straining the single crystal layer through annealing without using an implant step, in addition to the other limitations in the claims.

The prior art of record either teaches the use of different methods for forming the strained silicon-on-insulator structure, or alternately, the prior art teaches similar methods that result in

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structures other than a strained silicon-on-insulator. For example, Japanese Patent Publication 2001-284558 to Awano and U.S. Patent Publication No. 2002/0140031 to Rim teach formation of strained silicon on insulator by layer transfer from a donor substrate, and U.S. Patent No. 6,774,015 to Cohen et al. teaches formation of the strained silicon on insulator through an implanting and annealing method. Both of these prior art methods are distinctly different from that claimed, and either suffer from a cumbersome fabrication process, in the former case, or significant lattice damage in the latter case.

Alternately, the prior art of record, such as U.S. Patent Publication No. 2004/0094763 to Agnello et al., U.S. Patent Publication No. 2003/0077882 to Shih et al., and U.S. Patent Publication No. 2002/0168802 to Hsu et al. disclose a method including forming a single crystal silicon layer on an insulator, forming a SiGe (strain-inducing layer) on the single crystal silicon layer, and then annealing the structure. In these references, however, the layer thicknesses and annealing parameters are selected to cause germanium diffusion into the silicon layer to form a relaxed SiGe-on-insulator structure. Since these references are all drawn to formation of a relaxed SiGe-on-insulator structure and do not in any way contemplate formation of a strained Si layer, it is the Examiner's opinion that it would not be reasonable to modify any of these prior art methods to attain the claimed invention.

Since the prior art of record does not provide any suggestion of forming a strained single-crystal silicon-on-insulator structure using the claimed process, it is the Examiner's opinion that the invention as claimed is novel.

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4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. The prior art made of record is considered pertinent to applicant's disclosure.
- a. US 2004/0094763 to Agnello et al., US2003/0077882 to Shih et al., and US 2002/0168802 to Hsu et al. were applied supra for teaching SGOI formation using a method similar to the present invention.
 - b. JP 2001-284558 to Awano was applied supra for teaching strained SOI through layer transfer.
 - c. JP 2000-203023 to Itsushiki teaches use of SOI methods for forming a thin membrane.
 - d. The Applied Physics Letters article to Huang teaches methods for strain transfer of a SiGe layer formed on a Si layer to enable thicker SiGe layer growth.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer M. Dolan
Examiner
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